

System Analysis And Design

Chapter One: Basic concepts in Information System development

Topics

- System Analysis and design, System, Information systems, System thinking
- Types of Information Systems
- Participant in Information System Development
- Roles and qualities of System Analyst
- System development methodologies, Processes/Phase

Some basic definitions

- Systems Analysis and Design: *What is it?*
 - Systems analysis

Process of studying an existing system to determine how it works and how it meets user needs
 - Systems design

Process of developing a plan for an improved system, based upon the results of the systems analysis

Cont...

- System analysis and design is a step by step complex method where by computer based **information systems** that can perform basic business functions are developed and maintained.
- It can also be defined as a standard set of activities, methods, best practices, deliverables, and automated tools that stakeholders use to develop and maintain information systems.
- System AD is used to analyze, design and implement **improvements in the functioning of businesses** that can be accomplished through use of computerized information systems.

Cont...

- **It is based on two skills/knowledge**
 - Understanding of organizations objectives, structure and process (domain Knowledge)
 - Knowledge of how to exploit information technology for advantage
- **Out come of such SAD**
 - An application software (information systems) to improve users/employee efficiency
- *From the definition it is easy to understand that 'System', specifically 'information system' is a core concept.*

System

- A system is an interrelated set of components with an identifiable boundary, working together for some purpose.

Cont...

- **Characteristics of a system**
 - **Components** - either an irreducible part or an aggregate of parts (subsystem)
 - **Interrelated Components**- the function of one is tied to the function of the other
 - **Boundary**- the limits of the system within which the system is contained, and that separates it from other systems.
 - **Purpose**- The components work together to achieve some overall purpose: the system's reason for existence
 - **Environment**- Everything outside the system's boundary
 - **Interfaces**- the point at which the system meets its environment
 - **Input**- What the system takes in from the environment to function
 - **Output**- The result of the function of the system
 - **Constraints**- limits to the system in terms of its capacity

Example

- Viewing a car as a system helps us determine what the problem is and fix it by breaking the system down into its components.
- It is also important to consider the relationship one subsystem has with another in doing so.

Exercise

- Identify something as a system
- Identify and describe its characteristics (the 9 characteristics discussed)

Other Important system concepts

- **Decomposition**- being able to break down a system into its components. It also helps to build different parts of the system at different times or by different individuals.
- **Modularity**- relatively uniform size components or chunks.

Cont...

- **Coupling**- the extent to which subsystems are dependent on each other. Subsystems should be as much independent from each other as possible.
- **Cohesion**- the extent to which a module or a subsystem performs a single function. When we have highly cohesive modules, each module accomplishes one and only one function. This makes the module reusable in future programs. Take a biological system as an example. It has highly cohesive modules. It is possible to transplant a heart or kidney.

Cont...

- **Systems thinking**

- Is a mind set or way of viewing a world as a system. Actually, systems thinking is just one part of the skills a systems analyst requires
- it helps to see the big picture; it also helps to break problems down to their components to avoid complexity.
- It minimizes the effect a change in one module will have on another.
- It emphasizes on the relationship and the process that goes inside rather than constituent parts or just the sum of the parts. Accordingly
 - **“A system is bigger than the sum of its components”**

Information system

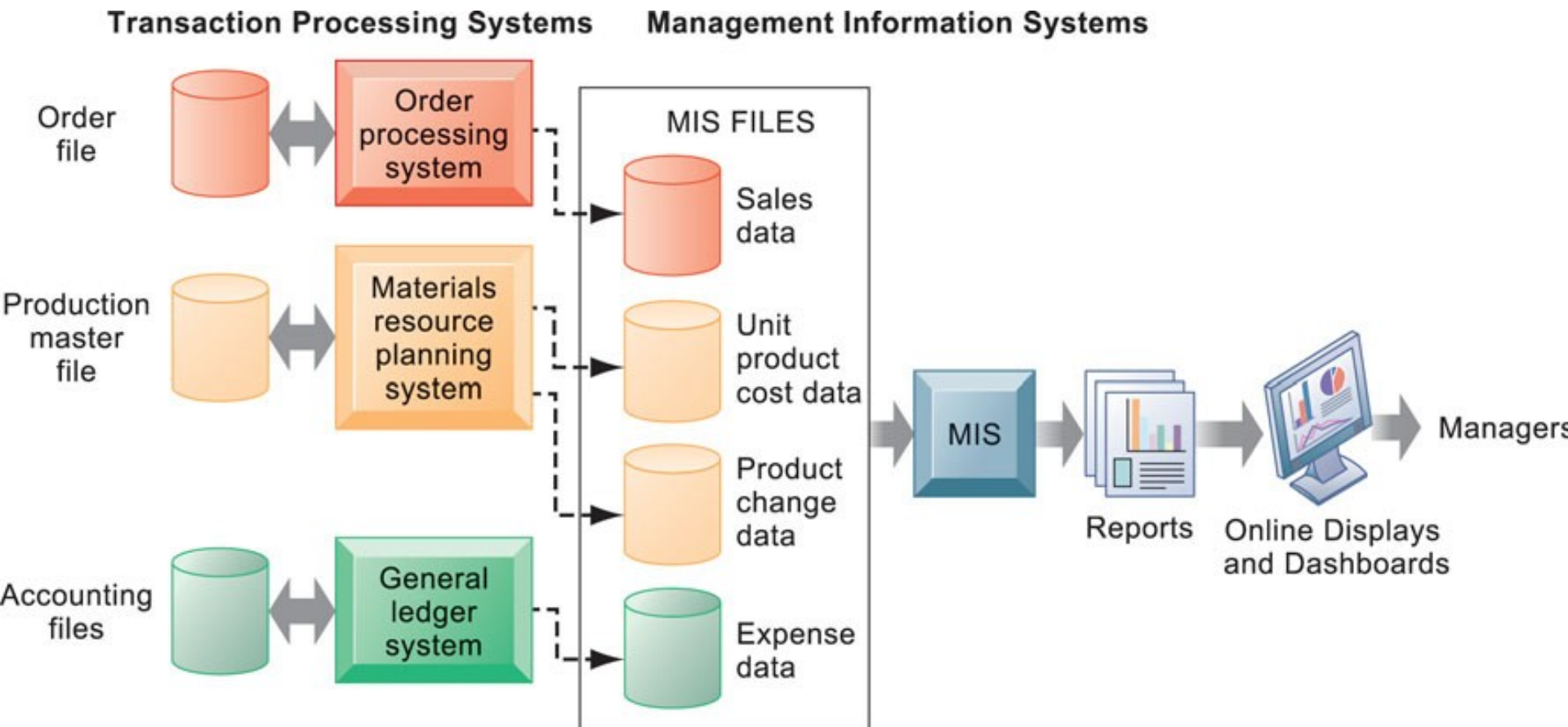
- Is an arrangement of people, data, processes, communication, and information technology that interact to capture, transmit, store, retrieve, manipulate and/or display information needed to support and improve day-to-day operations in a business as well as support the problem solving and decision making needs of management and other users.

Types of information systems

- IS can be classified into various types based on their function:
 - ***TPS***
 - ***MIS***
 - ***DSS***
 - ***ESS***

- **Transaction Processing Systems (TPS)**
 - perform and record the daily routine transactions necessary to conduct business, such as sales order entry, hotel reservations, payroll, employee record keeping, and shipping.
 - TPS are the foundation of other information systems

- **Management Information Systems (MIS)**
 - provide middle managers with reports on the organization's current performance.
 - the information is used to monitor and control the business and predict future performance
 - MIS summarize and report on the company's basic operations using data supplied by transaction processing systems.
 - Most MIS use simple routines, such as summaries and comparisons, as opposed to sophisticated mathematical models or statistical techniques.



- **Decision Support System (DSS)**
 - support more non-routine decision making
 - They try to answer questions such as these:
 - What would be the impact on production schedules if we were to double sales in the month of December?
 - What would happen to our return on investment if a factory schedule were delayed for six months?

- **Executive Support Systems (ESS)**
 - help senior management make strategic decisions
 - In addition to drawing summarized information from internal MIS and DSS, ESS are designed to incorporate data about external events, such as new tax laws or competitors.

Cont...

- ***Other Systems***

- E-commerce Applications: Business to Customer, Business to Business, and Customer to Customer
- Enterprise Resource Planning (ERP) systems- integrate many ISs existing at various levels of management and used for various functions.

Participants in Information System Development

- Usually system development is a team work and project based.
- Who do you think are the stakeholders (participates) in IS design and development?
- How do each of these stakeholders participate?

Cont...

- **System owners-** pay for the system to be built and maintained.
 - They own the system, set priorities for the system, and determine policies for its use. In some cases, system owners may also be system users.
- **System users-** are the people who actually use the system to perform or support the work to be completed.
 - System users define the business requirements and performance expectations for the system to be built.

Cont...

- **System analysts-** facilitate the development of information systems and computer applications by bridging the communications gap that exists between non-technical system owners and users and technical system designers and builders.
- **System designers-** are the technical specialists who design the system to meet users' requirements. In many cases, system designers may also be system builders.

Cont...

- **System builders** are the technical specialists who construct, test, and deliver the system into operation.
- **IT vendors and consultants** who sell hardware, software and services to businesses for incorporation into their information systems.

Systems Analyst

- Professional computer employee who performs analysis and design
- Change agent
 - Overcome reluctance of users to change

Systems Analyst *Functions*

Coordination

- Schedules and system-related tasks
- Personnel
 - Manager
 - Programmers
 - Users
 - Vendors of computer equipment

Systems Analyst *Functions*

Communication

- Oral presentations
- Written documentation

Planning and design

- Plans and designs new system
- Involved from beginning of project to final implementation of the system

System Analyst

Necessary skills required

- **Analytical skills**
- **Technical skills**
- **Management skills**
- **Interpersonal skills**

Cont...

- **Analytical skills**
 - **Systems thinking**
 - **Organizational knowledge-** how organizations work
 - Example a payroll system developed for a **Government Unit** wouldn't work for a **private company**
 - **Problem Identification-** a problem is the difference between an existing situation and a desired situation. Being able to see the real problem from an organizational perspective.
 - **Problem analyzing and solving-** finding out more about the problem, formulating alternative solutions, choosing the best alternative, devising a plan for its implementation.

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- **Technical skills-** programming languages, operating systems, database systems, data communication systems, system development tools, web development languages, CASE tools

Cont...

- **Management skills**

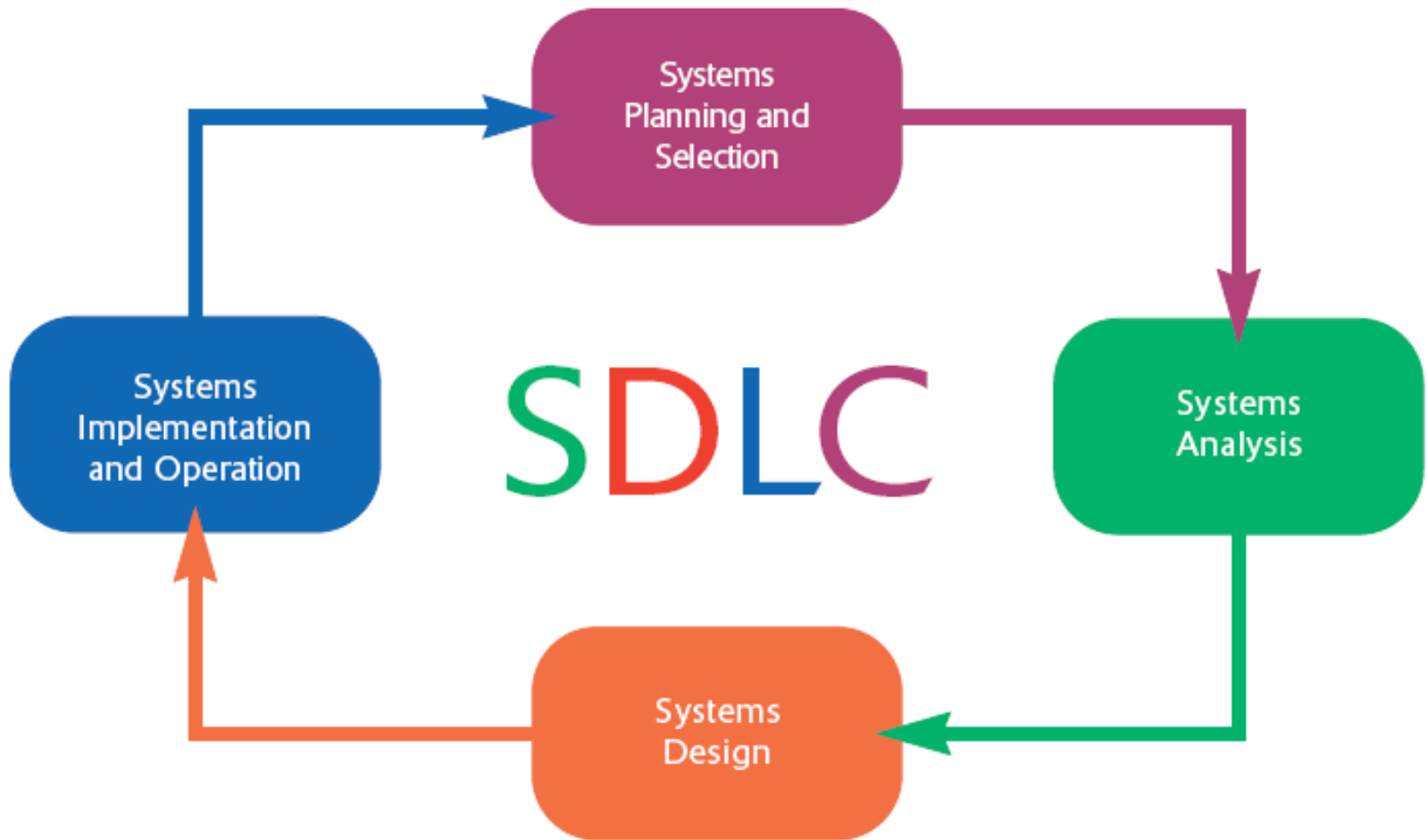
- Project management- prevent projects from coming in late or going over budget
- Resource management- delegating work, using resources effectively and efficiently
- Risk Management- identifying risk in an IS development process and minimizing it. For instance, use of standard or commonly used technology will be less risky.
- Change management- helps people make a smooth transition from one information system to another.

Cont...

- **Interpersonal skills**
 - Communication skills- interviewing, listening, written and oral presentations
 - Working in a team,
 - facilitating groups-guiding groups to work together
 - Managing expectations- educate pessimists and temper the expectations of others.

System Development Approaches, Methodologies and Phases/Processes

- Organizations use a standard set of steps, called a **systems development methodology**, to develop and support their information systems.
- The **systems development life cycle (SDLC)** is a common methodology for systems development in many organizations that marks the phases or steps of information systems development



Phase 1: Systems Planning and Selection

- The primary activities of this phase are:
 - identifying the need for a new or enhanced system and
 - Selection of projects that are perceived to meet the objectives of an organization
- Information system needs of an organization may result from:
 - Requests to deal with problems in current procedures
 - The desire to perform additional tasks
 - The realization that information technology could be used to capitalize on an existing opportunity

- Once a project is selected a plan is designed that lays out important issues such as:
 - *Feasibility study*
 - *Scope*
 - *Schedule*
- The plan is finally presented to the management to proceed to the next phase.

Phase 2: Systems Analysis

- During this phase, the analyst thoroughly studies the organization's current procedures and the information systems used to perform different tasks.
- The activities generally included in the analysis phase are:
 - determining the requirements of the system
 - Requirement structuring and elimination of redundancies
 - generating alternative initial designs to match the requirements
- The output of the analysis phase is a description of the alternative solution recommended by the analysis team

Phase 3: Systems Design

- During systems design, analysts convert the description of the recommended alternative solution into logical and then physical system specifications.
- Logical design is not tied to any specific hardware and systems software platform.
- During physical design decision is made regarding:
 - programming language
 - database systems
 - hardware platform
 - operating system, and
 - network environment the system will run under.
- The final product of the design phase is the physical system specifications

Phase 4: Systems Implementation and Operation

- During systems implementation and operation, you turn system specifications into a working system that is tested and then put into use.
- Implementation includes coding, testing, and installation.
- During operation, programmers make the changes that users ask for and modify the system to reflect changing business conditions.

Alternative approaches to development

- Prototyping
- computer-aided software engineering (CASE) tools
- joint application design (JAD)
- rapid application development (RAD)
- participatory design (PD)
- Agile Methodologies

Prototyping

- **Prototyping** is the process of designing and building a scaled-down but working version of a desired system
- The key advantages of the prototyping technique are:
 - it involves the user in analysis and design
 - it captures requirements in concrete, rather than verbal or abstract form

Computer-Aided Software Engineering (CASE) Tools

- **Computer-aided software engineering (CASE)** refers to automated software tools used by systems analysts to develop information systems.
- The general types of CASE tools include:
 - Diagramming tools
 - Computer display and report generators
 - Documentation generators
 - Code generators

Joint Application Design

- **joint application design (JAD)** is a process the purpose of which is to structure the requirements determination phase of analysis and the reviews that occur as part of the design
- Users, managers, and systems developers are brought together for a series of intensive structured meetings run by a JAD session leader

Rapid Application Development

- **Rapid application development (RAD)** is a Systems development methodology created to radically decrease the time needed to design and implement information systems.
- Focus is more on system functional and user interface requirements at the expense of detailed business analysis and concern for system performance issues

Participatory Design

- **participatory design (PD)** emphasizes the role of the user much more than do traditional techniques such as structured analysis and structured design
- Each user has an equal voice in determining system requirements and in approving system design

Agile Methodologies

- **Agile Methodologies** a family of development methodologies characterized by
 - short iterative cycles and extensive testing
 - active involvement of users for establishing, prioritizing, and verifying requirements and
 - a focus on small teams of talented, experienced programmers.